Contribution ID: **252** Type: **Poster**

Pb-210 and Po-210 in Some Medicinal Plants

Tuesday, 13 May 2014 17:15 (1h 30m)

In recent decades, a global trend has been observed in an increased consumption of medicinal plants and herbal formulations, which makes monitoring of herbal medicines to be an actual problem as regards their pollution with heavy metals, pesticides and radionuclides [1]. The highly-toxic are long-lived decay products of U-238 Series, 210Pb and 210Po. In plants, which are used for making medicinal formulations,the 210Po content can be as high as several tens of Bk/kg [2].
The aim of the present work was to determine specific radioactivity of 210Pb and 210Po in medicinal plants, which are commercially available via the network of pharmacies, and to estimate the effective radiation dose due to 210Po in humans for a 30-day course of treatment with phyto-teas prepared by infusion from these herbs. Po-210 in samples and in aqueous extracts were determined by alpha-spectrometry. The samples were digested with a mixture of H2O2+HNO3(conc.). The aqueous extracts were obtained according to the recommended procedure. 210Po was quantitatively self-deposited on nickel discs,the remaining solution having been kept for 6 to 8 months for 210Po to accumulate from 210Pb. After that period 210Po was deposited again. As a tracer to check chemical yields,a mixture of 208Po and 209Po was used. All data are recalculated for the time the samples were made.
Six samples were studied. They are:
1. Quercus dalechampii Ten.;
2. Alpinia officinalis L.;
3. Ledum palustre L.;
4. Betula pendula Roth;
5. Plantago major L.;
6. Artemisia absinthium L.

Specific radioactivity of 210Pb was from 1.3 (Alpinia officinalis L.) to 18.1 (Ledum palustre L.) Bq/kg d.w. and that of 210Po was from 94 (Betula pendula Roth) to 2257 (Ledum palustre L.) Bq/kg d.w. The 210Po/210Pb ratio in the samples under study substantially exceeds unity, which means that the origin of 210Po in there is not related only to radioactive decay of 210Pb. A fraction of the “unsupported”210Po is mere 0.2–5.0% of the total amount of the radionuclide, whereas the “unsupported”210Po fraction is close to 100%. Analogous results are given in [3]. The obtained data can be explained by a predominant absorption of 210Po over 210Pb by plants from the environment. For example, it is known that the mean value of the 210Po/210Pb ratio in air is 0.17, in atmospheric deposits, from 0.1 to 0.54, whereas in soil it is close to 1.0 [4].
The mean annual dose of radiation for the population of the Russian Federation due to 210Pb, 210Po, 228Ra, and 226Ra radionuclides in food and drinking water is estimated to be at a level of 164 μSv/yr [5].The radiation exposure due to 210Po, which enter the human organism with a daily consumption of 100-300 mL of medicinal plant infusions for 30 days, is from 2 to 21 μSv. It amounts from 1 to 13% of mean annual dose.
Based on the above, a conclusion is drawn on that the relative contribution of phyto-teas into the effective annual radiation dose due to Polonium-210 in humans is substantial and should be taken into account.

1.Chan K. Some aspects of toxic contaminants in herbal medicines. Chemosphere,52,2003,1361 –1371.
2.Desideri D. et al. Natural and artificial radioactivity of some medicinal plants. J. Environ. Radioact.,101,2010,751 –756.
3.Vaaramaa K. et al. Distribution of 210Pb and 210Po concentrations in wild berries and mushrooms in boreal forest ecosystems. Sci. Total Environ.,408,2009,84 –91.
4.Parfenov Y. D. Po-210 in the environment and in the human organism. Atomic Energy Rev.,12,1974,75 –143.
5.Commentaries to Radiation Security Norms (NRB-99-2009). Moscow, 2009 (in Russian).

Primary author: Mrs PUCHKOVA, Elena (Saint-Petersburg State University)

Co-author: Ms BOGDANOVA, Oksana (Saint-Petersburg State University)

Presenter: Dr GOMZINA, Natalia (N.P.Bekhtereva Institute of the Human Brain, Russian Academy of Sciences (IHB RAS), St. Petersburg, Russia)

Session Classification: Poster Session - Radionuclides in the Environment, Radioecology

Track Classification: Radionuclides in the Environment, Radioecology